Python Programming Essentials

Python Basics
Python is a high-level, interpreted programming language known for its simplicity and readability. It supports multiple programming paradigms including procedural, object-oriented, and functional programming.

Data Types:
- Numbers: int, float, complex
- Sequences: list, tuple, range
- Text: str
- Mapping: dict
- Set Types: set, frozenset
- Boolean: bool

Control Flow:
- if-elif-else: Conditional execution
- for loops: Iterate over sequences
- while loops: Repeat while condition is true
- break and continue: Loop control

Functions:
- Defined using 'def' keyword
- Can have default parameters
- Support *args and **kwargs
- Lambda functions for simple operations

Object-Oriented Programming:
- Classes define objects with attributes and methods
- Inheritance allows code reuse
- Encapsulation protects data
- Polymorphism enables flexible code

Important Libraries:
- NumPy: Numerical computing
- Pandas: Data manipulation and analysis
- Matplotlib: Data visualization
- Scikit-learn: Machine learning
- TensorFlow/PyTorch: Deep learning
- Django/Flask: Web development

Best Practices:
- Follow PEP 8 style guide
- Write descriptive variable names
- Use list comprehensions when appropriate
- Handle exceptions properly
- Write unit tests
- Document your code with docstrings

Common Patterns:
- Context managers (with statement)

- Decorators for modifying functions
- Generators for memory-efficient iteration
- List/Dict comprehensions for concise code